MAUL FOSTER ALONGI

MEMORANDUM

To: Mr. Dana Bayuk

Date: September 16, 2009

From: James G.D. Peale, RG

Project: 8128.01.20

RE: Enhanced *In Situ* Bioremediation Performance Monitoring Data Submittal

Dana – attached please find a Microsoft Excel file containing performance monitoring data from the Group 1, 2, and 3 performance monitoring wells (PMWs) at Siltronic. The data confirm successful full-scale installation of the EIB permeable reactive barrier (PRB), and the initial results are very encouraging. MFA has developed the following observations regarding the data.

Group 1 and 2 PMWs

- RAO 1 (TCE concentrations below the injection threshold) has been achieved in 21 of the 23 Group 1 and 2 PMWs.
- Decreasing trends for DCE and vinyl chloride (simultaneous with decreasing TCE trends) were observed in some Group 1 and 2 PMWs, suggesting contribution from abiotic mechanisms.
- Abiotic mechanisms were also suggested by the production of low concentrations of chlorinated ethanes such as 1,1,2-trichloroethane (TCA), 1,1-dichloroethane (DCA), 1,2-DCA, and chloroethane (CA). TCA, DCA and CA are likely produced by abiotic hydrogenation of TCE, DCE, and vinyl chloride (respectively).
- Concentrations of sulfate decreased in all of the Group 1 and 2 PMWs, confirming reducing conditions circa -250 mV.
- Successful distribution of EHC™ within and downgradient of the EIB PRB has been confirmed by increased concentrations of iron in all of the Group 1 and 2 PMWs, with one exception. The exception is Group 2 PMW WS-36-81, where iron concentrations dropped from approximately 70 mg/L to 35 mg/L. However, concentrations of fermentation byproducts (ketones and fatty acids) in this well are increasing, confirming distribution of EHC™ in this area. TCE has been reduced to below the injection threshold in this well.

- Low to moderate levels of *Dhc* bacteria were detected in selected Group 1 PMWs sampled in February 2009, prior to KB-1 injections. These results confirm the presence of native bacteria capable of dechlorinating TCE and its degradation products in the source area.

Group 3 PMWs

- RAO 2 (concentrations below Joint Source Control Strategy Screening Level Values) has been achieved in four PMWs (WS-21-131, WS-24-126, WS-26-86, and WS-27-86).

- Decreasing trend data in two PMWs (WS-25-111, WS-26-116) suggest that RAO 2 will be achieved by the end of 2009.

- Decreasing trend data in two PMWs (WS-21-112 and WS-25-96) suggest that RAO 2 will be achieved for TCE and vinyl chloride by the end of 2009, but poor data fit prevents forecasting for cis-1,2-DCE.

- Trend data from two PMWs (WS-23-116, WS-24-111) are decreasing for TCE and vinyl chloride, and increasing for cis-1,2-DCE.

- *Dehalococcoides (Dhc)* bacteria were detected in seven of the nine Group 3 PMWs tested (WS-24-155 was not sampled for *Dhc* pending results representative of the CVOC plume). These results confirm the presence of native bacteria capable of dechlorinating TCE and its degradation products.

- VOCs characteristic of the chlorinated VOC plume and the manufactured gas plant (MGP) plume have not been detected in angled PMW WS-24-155 to date. Other analytes are characteristic of groundwater from the alluvial aquifer.

Subsequent data will be evaluated in the context of the Performance Monitoring Plan (PMP), pending receipt of DEQ comments.

Attachment: PMW Data file (electronic only)

cc: Tom McCue, Siltronic Corporation (electronic and hard copy)
Alan Gladstone, Davis Rothwell Earle and Xochihua (electronic and hard copy)
Chris Reive, Jordan Schrader Ramis (electronic and hard copy)
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